

CEREMONY REPORT
COMMEMORATIVE PLAQUING
of
BURRINJUCK DAM
and
BURRINJUCK No1 POWER STATION
as a
NATIONAL ENGINEERING LANDMARK
by
MR IAN PEDERSEN FIE AUST
NATIONAL PRESIDENT
INSTITUTION OF ENGINEERS, AUSTRALIA



BURRINJUCK DAM via YASS, NEW SOUTH WALES
on
MONDAY 8th NOVEMBER 1999

PLAQUING CEREMONY AT BURRINJUCK

The ceremony to mark the plaquing of the Burrinjuck Dam and Burrinjuck No1 Power Station was a celebration at many levels. It acknowledged the national engineering significance of the project and the professional skills of its builders, it was a re-union for many who had worked on the construction and operation of the works, and it brought together representatives of the civic and farming communities of the Murrumbidgee Irrigation Area.

Burrinjuck is now a renowned and beautiful recreation area, but its climate can be unpredictable, and for the more certain comfort of the sixty or more people who attended, the major ceremony was held under cover in a section of the maintenance workshop.



The National President of the Institution, Mr Ian Pedersen, unveiled the National Engineering Landmark plaque on a temporary plinth within the Workshop. The plaque has since been relocated to its permanent location on the Working Platform at the Dam.



It is of the nature of major water storages that they can be relatively inaccessible, and the organising committee was therefore grateful that representatives of the Institution from the National Office and from Sydney Division had travelled so far to join the National President in celebrating the occasion.

Major addresses were given by Mr Pedersen and by the Hon Ian McDonald MLC representing the Premier of New South Wales and the Minister for Land and Water Conservation. Both of these addresses are included as appendices to this report.

The plaquing ceremony was organised by a Committee consisting of representatives of the owners of the Dam and of the Power Station, of Yass Shire Council and of the Engineering Heritage Committee of Sydney Division, the proponents of the nomination.

Members were as follows:

Mr Abel Immaraj

Actg General Manager of State Water, a Business Unit of the Department of Land and Water Conservation, the owners of the Dam - later to be followed by

Mr Doug Rhodes

Actg General Manager of State Water

Mr Neville Marks

Secretary of Pacific Power, the owners of the Power Station

Mr John Glover

Councillor of Yass Shire Council

Ms Deborah Brooks

Communications Consultant to State Water

Mr Ian Hill

Officer-in-Charge, Burrinjuck Dam

Mr Frank Brady

Member, Engineering Heritage Committee of Sydney Division and Chairman of the Committee

Site arrangements were principally in the hands of Mr Hill of State Water and considerable assistance was provided by Pacific Power in the preparation and issue of invitations and the production of the commemorative brochure. Samples of these documents are included in this report.

Guests were served with morning tea on arrival and then moved into the Workshop where a display of historical photographs and memorabilia had been mounted. The photographs were drawn from the records of the Department and a specially printed selection of photographs produced by Pacific Power from a CD-ROM provided by Mr John Glover, (member of the Committee and Chairman of the Burrinjuck State Recreation Trust).

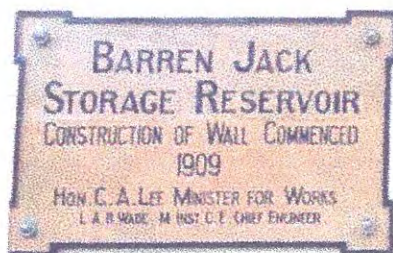


L to R - Ian Pedersen, Ian Macdonald, Doug Rhodes, Frank Brady

Speakers at the ceremony were

Mr Doug Rhodes	Welcome to Guests
Mr Ian Mcdonald MLC	The Economic and Social Significance of Burrinjuck Dam
Mr Ian Pedersen FIE Aust	The Engineering Significance of Burrinjuck Dam and No1 Power Station
Proceedings were chaired by Mr Frank Brady	Engineering Heritage Committee, Sydney Division

Following the unveiling of the plaque by the President, the Official Party and guests were conducted on a tour of the site, including a view of the old power station from the crest of the dam. Also included was an inspection of the several plaques which record the modification and upgrading of the dam to satisfy contemporary standards of safety. The Institution's Information Plaque had already been installed as part of this group and the National Engineering Landmark Plaque has now been added.



Plaques on the Working Platform



On the Dam Wall Parapet
L to R - Doug Rhodes, Ian Macdonald MLC, Katrina Hodgkinson MP, Frank Brady, Ian Pedersen



Guests inspecting Plaques on the Working Platform





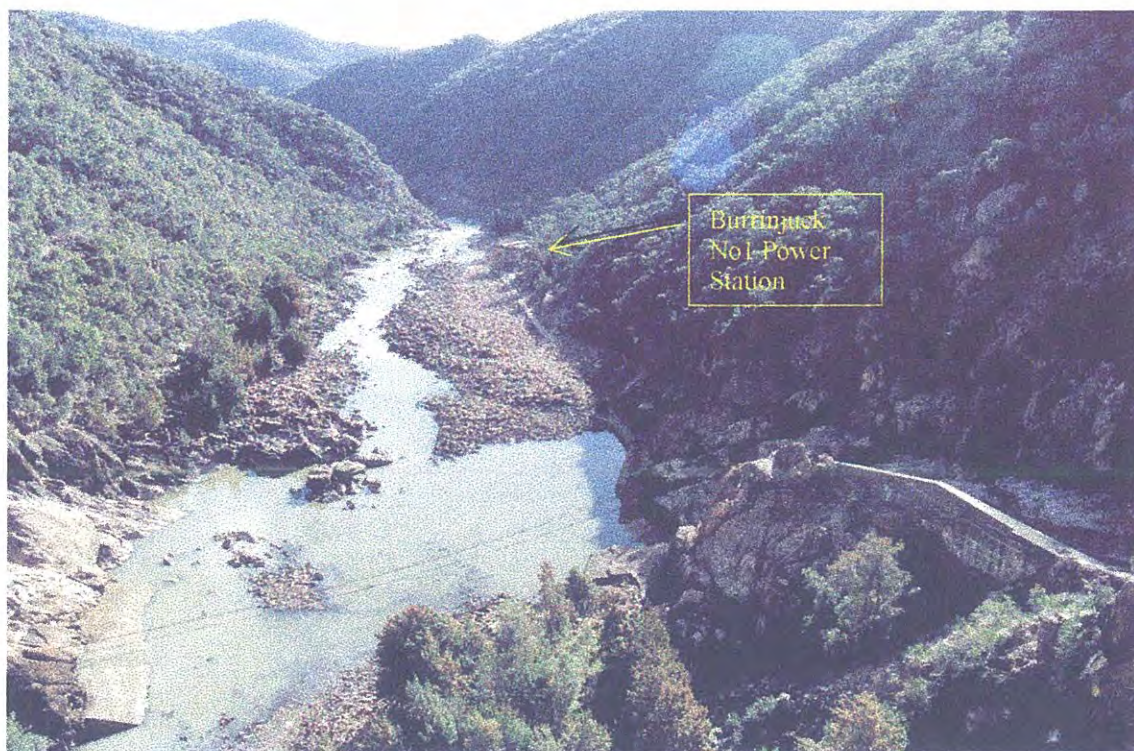
BURRINJUCK DAM AND Nº 1 POWER STATION

BURRINJUCK DAM AND THE MURRUMBIDGEE IRRIGATION AREA FORMED THE FIRST LARGE SCALE IRRIGATION SCHEME IN NEW SOUTH WALES (NSW). DESIGNED BY L. A. B. WADE, CONSTRUCTION BEGAN IN 1907. IRRIGATION WATERS WERE FIRST RELEASED IN 1913 AND CONSTRUCTION TO FULL HEIGHT WAS COMPLETED BY 1928, MAKING BURRINJUCK THE LARGEST DAM IN AUSTRALIA.

THE Nº 1 HYDRO-ELECTRIC POWER STATION WAS COMPLETED IN 1927 WITH A CAPACITY OF 10,000 KILOWATTS. LOW-COST ELECTRICITY FROM BURRINJUCK SUPPLIED THE SOUTH WEST OF NSW THROUGH A 66,000 VOLT TRANSMISSION NETWORK, THE MOST EXTENSIVE IN THE STATE AND THE FIRST TO USE THIS VOLTAGE IN NSW.

DEDICATED BY
THE INSTITUTION OF ENGINEERS, AUSTRALIA
DEPARTMENT OF LAND & WATER CONSERVATION
PACIFIC POWER
1999

The Information Plaque, now mounted alongside the historical sequence of plaques on the Burrinjuck Working Platform



No1 Power Station from Dam Wall, Northern Spillway on right with former penstock at foot of spillway



Burrinjuck Storage on the day of the Plaquing Ceremony – Northern Spillway on the left

After the tour of inspection, guests were provided with a light buffet luncheon, which had been catered by ladies of the local community. The Institution is indebted to them and to the two owners of the works – The Department of Land and Water Conservation and Pacific Power, who jointly met all of the costs of the ceremony and of refreshments at site.

Submitted on behalf of the Engineering Heritage Committee of Sydney Division.

Frank Brady

Chairman of Organising Committee

ADDRESS BY THE HON IAN MCDONALD MLC
NATIONAL ENGINEERING LANDMARK
AWARD CEREMONY
BURRINJUCK NEW SOUTH WALES
MONDAY 8 NOVEMBER 1999

ECONOMIC AND SOCIAL SIGNIFICANCE OF BURRINJUCK DAM

Ladies and gentlemen, good morning

It is with pleasure that I am with you today to represent the Premier and the Minister for Land and Water Conservation and Minister for Agriculture for the official unveiling of the National Engineering Landmark plaque at Burrinjuck Dam.

When the name Burrinjuck comes up most people will think of water, irrigation, or a large concrete dam, but may not think of poetry. Henry Lawson was possibly the first Public Relations person in Australia to promote irrigation. The then Water Conservation & Irrigation Commission employed him in January 1916, as Publicity Officer at Leeton. His appointment was arranged by the State Premier in an attempt to rescue Lawson from alcoholism, poverty and fading literary powers.

Lawson resigned in September 1917 and after a long decline he died in 1923. He wrote several poems about the area including "The Passing Stranger at Burrinjuck", "A Son of Yanco", "Leeton Towns", "Scots of the Riverina" and "Those Foreign Engineers".

His words about Burrinjuck are just as relevant today as when they were written:

The autumn sunrise is slowly gilding
The mountains marking the river's course
And down by the great grey dam in building
The crane swings round like a weary horse;
And, over the ranges, rough and ridgy,
Old Mountains 'Black Andrew and Barren Jack'
Are guiding the course of the Murrumbidgee
As they have guided for ages back.

Henry Lawson, 1916

It is sad that Lawson never saw the fruits of his labour in promoting irrigation. As a member of the Legislative Council I find it personally fitting that I represent the Premier and Minister today as another member of the NSW Legislative Council was instrumental in the development of the Murrumbidgee Irrigation Area. He was Sir Samuel McCaughey, a local pastoralist who was the owner of North Yanco, the site of the future Leeton.

The first wave of European habitation was the Squatters who took up huge parcels of land and ran them as pastoral runs with large herds of cattle and flocks of sheep. Then in the 1880s farming families came to this area as a direct result of John Robertson's 1861 land Act. These families became known as the Selectors. No more than 100 people earned a living in this area. Much of the land carried only one sheep to two hectares with the ever present threat of drought.

In 1906 the "Barren Jack and Murrumbidgee Canals Construction Act" became a reality and the NSW Public Works Dept was authorised to carry out the necessary construction work. Thus began the giant task of establishing the immense scheme that was to completely transform the country side and to be the beginning of this unique pioneering venture. The first step in the mammoth undertaking was the construction of Burrinjuck Dam, as it finally became known.

Burrinjuck Dam was the first major dam built for irrigation in NSW and, when construction began in 1907, it was the fourth largest dam in the world. In conjunction with Blowering Dam on the Tumut River, Burrinjuck Dam provides regulated flows, not only for the Murrumbidgee Irrigation Areas, but also for the whole of the Murrumbidgee Valley.

I must say that I am quite impressed with the specifications of the dam. Burrinjuck Dam holds a maximum of 1,026,000 million litres - that is almost twice the amount of water as there is in Sydney Harbour. It covers an area of 5,500 hectares or more than 8,000 football fields. The catchment area of Burrinjuck Dam is 12,953 square kilometres, which is larger than the catchment area of the whole of the Snowy Mountains. Today, Burrinjuck Dam provides an average of about 1.2 million megalitres a year for the irrigation of crops in the Murrumbidgee Irrigation Area including fruit and vegetables, as well as pastures for fat lambs and beef cattle.

I would like to mention the importance that the early pioneers played in establishing the Murrumbidgee Irrigation Area. It is estimated that in 1913 one fifth of MIA settlers came from Broken Hill. By 1949 a substantial change had occurred in the social background of farmers. In 1924, soldier settlers had occupied 61 % of horticultural holdings in the MIA and 1 % by Italians. In 1949 the figures were 18% and 32% respectively, and in 1972 Italians occupied 75% of holdings. The figure was lower in the Leeton (Yanco) area - 50% - but still a significant presence in the community.

Multiculturalism owes a lot to Burrinjuck. The European, and British settlers brought with them a sophistication and culture which has enriched the whole community.

The MIA area is now home to approximately 520,000 people, with a population growth rate of 1.5 per cent. Australia's capital Canberra with 305,000 people and NSW's largest inland city of Wagga Wagga, 57,000 people, are both situated within the catchment. Other major urban centres include Cooma, Queanbeyan, Yass, Cootamundra, Tumut, Junee, Henty, Narrandera, Leeton, Griffith, Hay and Balranald.

The region is one of the most densely populated in rural Australia. which is reflected in the fact it features two universities (Charles Sturt in Wagga Wagga and the ANU in Canberra).

This area has become one of the main foods producing areas in Australia. Murrumbidgee is arguably the most important horticultural area in the State. For example, 80% of NSW carrots are grown at Griffith, all the gherkins used in that well-known Scottish food chain are grown in the MIA and 80% of NSW wine is produced in the area.

The Riverina alone accounts for 25 per cent of the State's fruit and vegetable production, 42 per cent of the State's grapes and 50 per cent of the country's rice production, with large export sales. Irrigated agriculture across the region produces approximately \$200 million worth of rice annually, \$35 million worth of vegetables, \$70 million worth of grapes, \$96 million worth of fruit and \$7 million worth of dairy products.

Predominantly dryland industries such as livestock, cropping and timber are also major contributors to the region's economy. Sheep meat sales, without taking into account store sheep transactions, total \$107 million, wool \$240 million, beef \$273 million and cropping \$101 million.

I haven't spoken about the recreational joys of Burrinjuck as part of the social significance of Burrinjuck - everyone here knows them well – and if they don't then I recommend that they go fishing this afternoon. Bill Wannan could have been writing about Burrinjuck in 'Fair Go Spinner'" in this story:

'Well said old Jack, 'if it's fishin' you want, the Murrumbidgee's the place for big-uns. 'Do they bite well there?' a mate asked.
'Bite well! Listen, I've seen the time when you had to hide behind a tree to bait your flamin' hook!'

About a quarter of a million tourists a year sample the delights of the dam and its surrounds. These delights include camping and caravanning, boating, fishing, water-skiing, swimming, bush walking, bird watching and picnicking.

Burrinjuck has helped to develop what is today a unique and very prosperous Area. - a prosperity achieved by an extremely hard-working community, bringing about what is probably another unique circumstance in the State, if not the whole of Australia, that some or several products are harvested every month of the year.

**SPEECH BY THE PRESIDENT OF THE INSTITUTION OF ENGINEERS,
AUSTRALIA**

Mr Ian Pedersen FIE Aust

on the occasion of

**THE UNVEILING OF A PLAQUE COMMEMORATING
BURRINJUCK DAM AND BURRINJUCK No 1 POWER STATION**

as a

NATIONAL ENGINEERING LANDMARK

THE HISTORIC ENGINEERING PLAQUING PROGRAM

The plaquing program of the Institution of Engineers serves several purposes. It is one of the ways in which the Institution seeks to remind the community of the contribution which the engineering profession has made, and is making, to the health, the wealth and the happiness of our society - it reminds engineers of the social importance of their work and of the need to respect changing community values, and it directs the minds of the younger members of our profession to the skill of their predecessors and the sense of social responsibility which they displayed.

Throughout Australia there are many works which have been recognised by this program. There are two levels of recognition, the Historic Engineering Marker, which makes up the larger number of plaqued works, and much rarer, the National Engineering Landmark, reserved for works of outstanding and national significance.

Today Burrinjuck Dam and the No 1 Power Station join the select group of National Engineering Landmarks, works that include such icons as the Sydney Harbour Bridge, the Snowy Mountains Scheme and the Coolgardie Goldfields Water Supply Scheme in Western Australia. All of these have in common that they made a major contribution to their society, that they were of world rank and that they displayed significant engineering skill in their conception and execution.

STATEMENT OF SIGNIFICANCE

- At the time of its construction and for some years thereafter, Burrinjuck ranked as the largest water storage in Australia and among the largest dams built anywhere in the world.
- Design was carried out entirely by Australian engineers, drawing on the experience of the Chief Engineer L A B Wade in building water supply dams throughout NSW
- Burrinjuck was the critical component of the Murrumbidgee Irrigation Area Scheme, a vast and courageous concept that required the builders of the Scheme to be engineer, land developer, agricultural engineer, municipal authority, landlord, and migration agent.
- The ninety-two year history of Burrinjuck encapsulates the progressive refinement of the techniques of design and hydrology for large dams in Australia, and its survival is a tribute to the courage and intuitive skill of early designers.

- The hydro-electric power station and power scheme based on Burrinjuck was the first in NSW to be planned as an integrated scheme of power generation and transmission scheme over a wide area, and pre-dated by twenty five years later developments of that character in NSW.

The conception and execution of Burrinjuck since 1907 provide a living history of the evolution of Australian engineering competence in many fields - hydrology, dam design and construction, and the interpretation of meteorological data. By today's standards, the tools and data available to the original designers were seriously short of the mark. Inadequacies in the hydrology and the design of the structure emerged at several points along the way but the problems were faced and solved, and Burrinjuck stands today, on so many counts, as a National Engineering Landmark. Indeed the list of engineers whose names are associated with Burrinjuck is a roll-call of the some of the "greats" of engineering practice in this country – not only L A B Wade, but others including Ernest de Burgh, J J C Bradfield and William Corin.

In one sense, Burrinjuck deserves to be recognised as a National Engineering Landmark because it is still there! This is not said frivolously but rather as a tribute to the courage of early engineering designers, who, notwithstanding the severe limitations of the state of knowledge in their profession, were prepared to undertake this major work. It represents the triumph of empiricism and the use of the "safety factor" in engineering design to make provision for the unknown and unknowable. We are invited therefore to recognise the kind of genius that allowed early engineers to produce designs that would endure, relying substantially on intuitive perception and judgement.

Burrinjuck was the key to the development of the Murrumbidgee Irrigation Area, a courageous experiment in social engineering on a scale unprecedented in Australia. The scheme itself has had its critics over the years, but in the fullness of time it has matched the ambitious hopes of its original proponents, as Ian Macdonald has so eloquently described.

From the outset it was recognised that Burrinjuck offered the potential for joint hydroelectric development. From the vantage point of the end of the century the generating capacity seems slight. But in its day it made a major contribution to the electrification of the South-west of the State by bringing low-cost hydroelectric power to towns dependent on the costly and capricious little steam-driven plants that preceded Burrinjuck. Of great significance from an engineering standpoint was the quite sophisticated plan to integrate the hydroelectric capacity at Burrinjuck with coal-fired generation - on the Southern Coalfields of NSW and in the Federal Capital - by way of electrical interconnection in order to provide an optimal use of both resources. The implementation of this plan had to await the growth of electrical demand and the construction of the high voltage interconnection between Burrinjuck and Port Kembla. But the soundness of the original concept was vindicated in the 'twenties and 'thirties and provided a model for the later development of the NSW interconnected grid system.

THE BEGINNINGS OF IRRIGATION IN NSW

Everyone talks about the weather but it falls to few to do something about it. Included in their number are those who conceived, promoted and built Burrinjuck and the MIA. Hanrahan's famous cry that "we'll all be rooned" had a savage resonance for those seeking to win a living from the land in this part of the world, and it is appropriate to remember those who were the pioneers.

Hugh McKinney was the first of these, a British civil engineer working with the Indian Irrigation Department who came to Australia to work on Sydney's water supply in 1879. He joined the Lyne Royal Commission on water conservation in 1884 and found that there were literally no statistics on water flows in the State and only the most primitive information on land levels and survey data. He made a start on all of these and continued his pioneering hydrographic work, most notably in the Public Works Department, and began to develop specific proposals for irrigation schemes on the Murray and Murrumbidgee.

Next was Frederick J Home, a retired Indian Army colonel, who was commissioned to report in 1897 on the prospects for irrigation and water conservation in NSW. His overall assessment was sombre but he did identify potential irrigation projects on the Murray and the Murrumbidgee. Of the various storage sites considered, he apparently favoured that finally chosen for the Burrinjuck Dam.

Hugh McKinney re-emerged as a key figure in about 1903 as consultant to a private group headed by Robert Gibson, a grazier and stock and station agent in the Hay district. This group proposed the construction by government of a storage reservoir at Barren Jack, the site favoured by Home and endorsed by McKinney, and the creation by private enterprise of irrigation in the region between the Murrumbidgee and the Lachlan.

This proposal was taken up and amended by the government as a totally state-owned project under the advocacy of Joseph Davis, head of the Public Works Department, with technical input from L A B Wade who had succeeded McKinney as the PWD's predominant hydraulic engineer. The revised scheme was the subject of a report to Parliament by Wade on 7th September 1905, and on 23rd December 1906 Parliament passed the *Barren Jack Dam and Murrumbidgee Canals Construction Act 1906*.

The Public Works Department was named as the initial constructing authority but within a few years the Water Conservation and Irrigation Commission of NSW was formed to take over not only the construction of the dam but the irrigation area, its towns and infrastructure and municipal administration, and indeed the promotion of the scheme throughout Australia and overseas. As a publicist it was remarkably effective and every school-child for several generations thereafter knew of the might of Burrinjuck and the MIA. The Snowy Scheme has since assumed that mantle but in real terms Burrinjuck remains today as important as it was eighty and more years ago.

The work itself is huge, as you can see for yourselves, but no less impressive was the provision of access. The access rail line was, for many years, the longest narrow gauge line in Australia, 26 miles in length and involving the construction of three concrete dams. The present access road uses much of the original rail formation and as you follow its twists and turns, spare a thought for those who laboured mightily with pick and shovel, and horse and cart, to complete the original rail line in eighteen months.

I have dwelt on the pioneering days of Burrinjuck, for it is mainly these pioneers we seek to honour, but let me remind you of the quite major contribution of later generations of engineers and constructors who have modernised and upgraded Burrinjuck in no less than three major episodes of work. The development of engineering knowledge in hydrology and stress analysis has been profound in the ninety years since Burrinjuck was originally designed, and there have been correspondingly profound changes in the structure to ensure that contemporary standards of safety will be maintained. Today for example, the capacity of the spillways to discharge major floods is no less than fourteen times that of the original design. We owe all of those people a debt of gratitude for their contributions and we remember particularly and with sadness, those who lost their lives in the construction and operation of this wonderful structure.

So, it is with much pleasure, on behalf of the Institution of Engineers, Australia, that I rank Burrinjuck Dam and the Burrinjuck No 1 Power Station as one of the Institution's National Engineering Landmarks, and I unveil this bronze plaque to mark the occasion.

Ceremony for the Commemorative Plaquing



Burrinjuck Dam and
No. 1 Power Station

We have pleasure in inviting

Mr and Mrs F Brady

to celebrate

the commemoration of Burrinjuck Dam

and No. 1 Power Station

as a **National Engineering Landmark**

by Mr Ian Pedersen

National President, Institution of Engineers, Australia

at Burrinjuck Dam via Yass

Monday 8th November, 1999 at 11.00 am

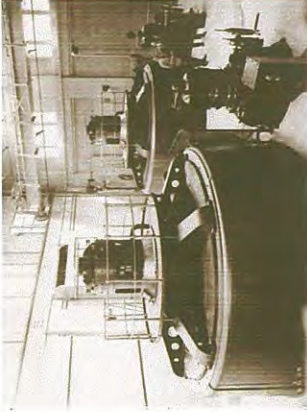
RSVP 28th October, 1999

Rosann Thompson

02 9268 8610

Email: Rosann.Thompson@pacificpower.com.au

Burrinjuck No 1 Power Station 1928



Master of Ceremonies

Mr Frank Brady AM
Member,
Engineering Heritage Committee,
Sydney Division of the
Institution of Engineers, Australia

Welcome

Mr Lindsay Beck
State Water Customer Service Manager
(South Area)

The Economic and Social Significance of Burrinjuck Dam

The Hon. Ian Macdonald MLC
Parliamentary Secretary to the Special Minister of State
and Assistant Treasurer

Burrinjuck Dam and No 1 Power Station ~ their heritage significance

Mr Ian Pedersen
National President, Institution of Engineers, Australia

Unveiling of Plaque

Inspection tour followed by light refreshments

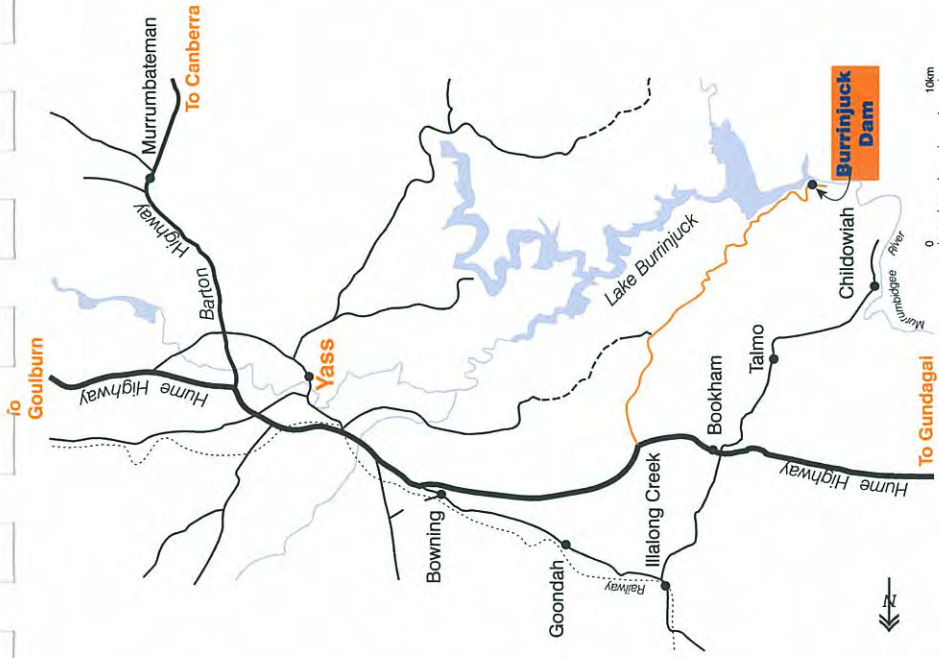
Programme

burrinjuck

as a **NATIONAL ENGINEERING LANDMARK**

burrinjuck Dam

Map and Location Plan



How to get to Burrinjuck Dam

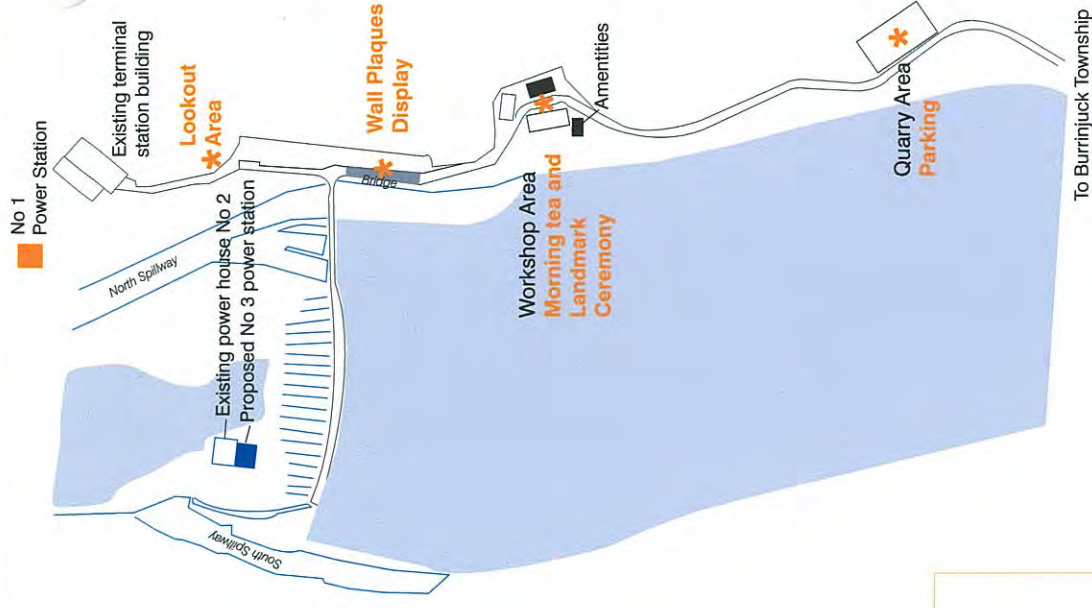
The town of Yass has now been by-passed and is so far from the Hume Highway that you might not even realise you have passed it. Keep a look out for the Yass Service Centre. It has MacDonalds, KFC and an Ampol service station, all clearly visible from the highway (unless there is a fog).

About 13km south of the Yass Service Centre the divided road finishes.

A further 7km on the left is the turn to Burrinjuck. The turn is very well signposted with large brown tourist type signs. If you find yourself at Bookham you have gone too far.

Follow the bitumen road about 26km, stay on the main road, make no turn-offs.

The last 12km or so are winding and very narrow - not steep.



After passing through Burrinjuck village (houses) you will come to the Quarry Area. Please park your vehicle in this area.

Morning tea will be available on arrival at the Workshop Area.

Note: Practical footwear is recommended.

Burrinjuck and electrical development

The hydro-electric potential of Burrinjuck was foreshadowed by L A B Wade in his 1905 report to the Parliament, but he recognised that a good many years must elapse before this potential could be exploited. In 1919, Parliament authorised the construction of hydro-electric works at Barren Jack plus transmission lines and necessary works for distribution of electricity. Site works began in April 1923 at a site approximately 2000 feet from the downstream toe of the dam wall.

Construction was considerably delayed by the 1925 flood which destroyed part of the penstock. Notwithstanding these problems, Burrinjuck and the Southern Electricity Supply were completed by 1927 and made a major contribution to the electrical development of the South West.

One of the most notable engineering features of the Southern Electricity Supply was its conceptual basis - transmitted supply over a vast area, planned to interconnect the hydro-electric plant with coal-fired generation at Canberra and at Port Kembla on the South Coast. Some 204 miles of 66kV transmission lines were built, the highest voltage then in use in NSW and by far the most extensive transmission system built in the State to that time.

The No 2 Power Station was constructed in 1938, immediately alongside the southern spillway of the dam. This addition, along with the No1 Station, made a significant and reliable contribution of 20,000 kilowatts during war-time and the blackout era of the 1950's. In the 1974 flood, the second highest on record, the No 1 Station was flooded and damaged beyond repair.

Burrinjuck today

Water is released from Burrinjuck for irrigation and environmental purposes and this water, where possible, is utilised for generating clean, green electricity. Operation of the Dam is the responsibility of State Water, a Commercial Business Unit of the Department of Land and Water Conservation, set up in 1997 to incorporate all bulk water delivery functions into a single business.

Pacific Power, the owner and operator of the Power Station, announced in June 1999 a \$30 million expansion of the Burrinjuck Hydro Power Station, to be completed in early 2001. This will increase the State's green power capacity by 15 megawatts, equivalent to the power used by 7,400 average country households. The upgrade will be environmentally friendly. There will be a bi-level water intake structure on the up stream side of Burrinjuck dam wall. This will allow cold and warm water to be mixed together and ensure that when the water travels downstream it will not damage the environment in any way.

No 1 power station



Commemorative Plaquing of

Burrinjuck Dam and No 1 Power Station



as a **NATIONAL ENGINEERING LANDMARK**

8th November, 1999

The Australian Historic Engineering Plaquing Program

The Institution of Engineers, Australia reserves the highest award of National Engineering Landmark for works that have contributed significantly to the development of Australia and the practice of engineering. Burrinjuck today joins such national icons as the Sydney Harbour Bridge and the Snowy Mountains Hydro-electric Scheme as a National Engineering Landmark

History

Brought of 1895 to 1902 renewed interest in the possibility of creating water storages on the River Murrumbidgee and its tributaries, and in 1902 an Interstate Royal Commission was established to review this matter. Progress was slower than some would have liked and in 1903, Hugh McKinney, consulting hydrologist previously with the Department of Public Works, and Robert Gibson, a grazier in the Hay district, proposed that the New South Wales Government build a dam at Barren Jack on the Murrumbidgee River, with private enterprise undertaking an irrigation scheme in the region between the Murrumbidgee and the Lachlan.

The outcome was the passage by the New South Wales Parliament on 23rd December 1906 of the Barren Jack Dam and Murrumbidgee Canals Construction Act 1906, under which the Government would build not only the Dam but the whole of the Murrumbidgee Irrigation Area as well. Initially, construction was the responsibility of the NSW Public Works Department but by 1912 the Water Conservation and Irrigation Commission (WC&IC) had been established to take over responsibility for the entire project.

The name "Burrinjuck"

The Dam is constructed between the twin granite peaks of Black Andrew on the south and Barren Jack on the north. The name Barren Jack was an attempt by the European settlers to render the Aboriginal words Borren Yiak, meaning a bold rugged feature of the landscape. The Lands Minister of the day, the Hon Arthur Griffith, was of the view that notwithstanding the use of the name "Barren Jack" in the enabling legislation, it had dismal connotations for a scheme of great fertility, and one which sought to attract settlers from Australia and overseas. Accordingly, he decided that the name should be "Burrinjuck" which he preferred and which he considered, in any event, a better rendering of the Aboriginal words.

Construction begins

One of the first tasks was to provide access to the site. It was determined that in such difficult terrain, the most effective scheme would be the construction of a 2 foot gauge railway from a new siding on the Main Southern Line at Goondah, south of Yass. Construction of the line began in 1907 and the work was completed in less than eighteen months. Twenty six miles in length, it was, for many years, the longest narrow gauge line in Australia. Three concrete dams were built to bridge water-courses and to provide water storages for the locomotives and the construction site. The largest of these dams impounds Lake de Burgh, named in honour of the Acting Chief Engineer, E M de Burgh, later to become Chief Engineer of Sydney Water Board. The dam and lake are still in existence.

Mr de Burgh acted during the absence through illness of L A B Wade, Chief Engineer and the man responsible for the design of Burrinjuck. Under his supervision, the engineering calculations were carried out by the young J J C Bradfield, who later made his mark on the Sydney Harbour Bridge and the Sydney City Rail system.

Initial site works at the dam began in 1907 involving the construction by day-labour of a coffer dam and the clearing of the river bed. When this work had been completed, construction was carried forward by a contractor, Lane and Peters, a firm which had previously constructed the Cataract water supply dam for the Sydney Water Board. The Burrinjuck contract ran from 1909 to 1919, with construction paced to match the growing demand for water, set by the rate of uptake of farm allotments in the Murrumbidgee Irrigation Area. From 1919 to completion in 1928, the works proceeded by day-labour under the direct control of the WC&IC.

Leading dimensions

As originally constructed, the dam had a maximum height above foundations of 247 feet, a crest length of 765 feet, a depth at the base of 160 feet and a radius of curvature on the upstream face of 1200 feet. Today, after a series of modifications and additions, the height of the dam has been raised by 13.4 metres (44 feet). Buttresses have been added to the downstream face and 160 post-tensioned cables with a total length of 18,000 metres have been installed to tie the structure to its granite foundations in order to stabilise the structure against increased flood loading. The volume of stored water at Full Supply Level is 1,026 gigalitres, with a surface area of 5,500 hectares.

Floods on the Murrumbidgee

When construction began in 1907 there were only meagre records of flood flows in the Murrumbidgee and it is not surprising that the design flood has had to be re-evaluated several times. The largest flood on record, in 1925, overtopped the wall by 3 feet 4 inches and continued to flow over the parapet for 29 hours. This caused the first of several reviews of spillway capacity and the dam has been substantially modified as a result. The first of these modifications took place from 1937 to 1956, then from 1974 to 1979, following the second highest flood on record, and finally from 1986 to 1994, resulting in the structure you see today. The spillway capacity is now some fourteen times that of the original design, and the structure satisfies the most stringent contemporary assessments of its ability to handle safely the Probable Maximum Flood, using design criteria which are far more rigorous than any ever contemplated by the profession when the dam was first constructed.

The 1925 flood at Burrinjuck



improving life with water

BURRINJUCK

DAM



INFORMATION

For more information on Burrinjuck Dam contact:

The officer-in-charge
Burrinjuck Dam
 via Yass NSW 2582
 Tel: (02) 6227 8121
 Fax: (02) 6227 8134

For more information about caravan & camping sites contact:

Burrinjuck State Recreation Area Park Booking Office
 Tel: (02) 6227 8114

Hume Tourist Park
 Tel: (02) 6227 1235

Burrinjuck Leisure Resort Park
 Tel: (02) 6227 7271

Good Hope Tourist Park
 Tel: (02) 6227 1234

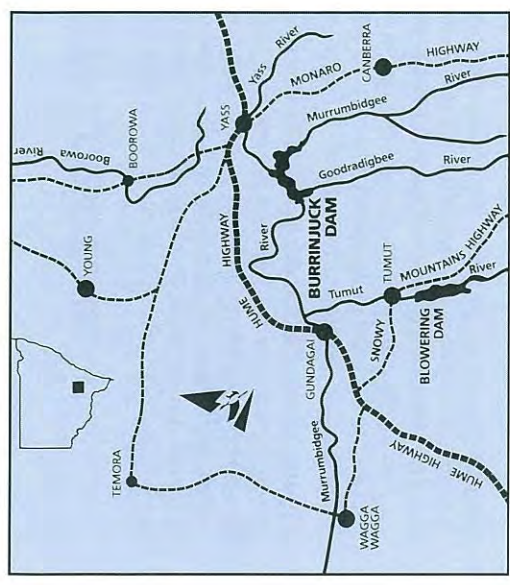
For information about other dams in NSW contact:

State Water
 Room 307
 23-33 Bridge St
 Sydney NSW 2000
 Tel: (02) 9228 6308
 Fax: (02) 9228 6370

or State Water Customer Service Area Offices:

North Area Tel: (02) 6752 9733
Central Area Tel: (02) 6884 2560
Coastal Area Tel: (02) 6542 1222
South Area Tel: (02) 6953 0700

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FACTS AT A GLANCE

HOLDING CAPACITY: 1,026,000 million litres (Megalitres), (almost twice the volume of water in Sydney Harbour).

SURFACE AREA: 5,500 hectares (more than 8,000 football fields).

CATCHMENT AREA: 12,953 square kilometres, larger than the catchment area of the whole of the Snowy Mountains

HEIGHT OF MAIN WALL: 97.8 metres (taller than the highest sail on the Sydney Opera House).

LENGTH OF MAIN CREST: 233 metres

WIDTH OF BASE: 58 metres

WEIGHT OF CONCRETE: Approximately 950,000 tonnes.

IRRIGATION: 1.2 million ML per year for crops in the MIA

The first major dam built for irrigation in New South Wales, Burrinjuck Dam is situated in the upper catchment of the Murrumbidgee River, 60 km from Yass. The name Burrinjuck comes from the Aboriginal words “Booren Yiack”, meaning “precipitous mountain”.

EARLY DAYS

In 1891, the drought-ravaged Murrumbidgee Valley was nominated as an ideal location for irrigation development. After devastating droughts in 1901 and 1902 State Parliament approved the establishment of the Murrumbidgee Irrigation Scheme. Burrinjuck Dam was constructed to provide water for the scheme.

However, due to delays caused by the shortage of labour and materials during World War I, the original design was not completed until 20 years later, although it was able to provide water for irrigation in 1912.

With the dam largely completed, a massive flood in the Murrumbidgee Valley in 1925 sent water more than a metre deep pouring over the crest of the main wall. Although Burrinjuck was barely damaged by the torrent, the size of the spillways were increased and the height of the main wall raised to prevent future devastation. Work on these alterations and other improvements began in the 1930s. Again, construction was delayed by a world war but finally, Burrinjuck Dam was completed in 1956. It was the first major dam built for irrigation in NSW and when construction began in 1907, it was the fourth largest dam in the world.

LATER DEVELOPMENTS

In 1995 at a cost of over \$63 million, the dam wall was raised by 13.6 metres for flood security upgrading.

In conjunction with Blowering Dam on the Tumut River, Burrinjuck Dam provides regulated flows, not only for the Murrumbidgee Irrigation Areas (MIA), but also for the entire Murrumbidgee Valley.

Before the valley was irrigated, the total population of the Yanco and Mirrool Irrigation Areas did not exceed 100 people and there were no towns. Today there are 34,000 people living in or near the towns of Leeton and Griffith, both of which owe their existence and prosperity to the Murrumbidgee Irrigation Scheme and Burrinjuck Dam.

Apart from supplying water for irrigation, there is a hydroelectric power station at the dam, which is owned and operated by Pacific Power. This power station and power scheme was the first in NSW to offer integrated planning of power generation and transmission over a wide area.

In 1999 the Institution of Engineers Australia awarded Burrinjuck Dam and the disused Number 1 Power Station the prestigious National Engineering Landmark Award.

THE STRUCTURE

Burrinjuck is a ‘mass gravity dam’. This type of dam holds back stored water by using its own weight to withstand the pressure from the water. The basic structure of the dam wall is similar to a gigantic brick wall. It is made of massive concrete blocks, which were cast *in situ* and contain huge granite boulders.

Following an analysis of the largest possible flood that could occur, the spillway capacity of Burrinjuck Dam was re-evaluated and the spillways were upgraded and enlarged. One hundred and fifty steel cables were inserted into the structure at bedrock level (at a maximum length of 130 metres) and each cable was post tensioned to 1,100 tonnes each, effectively tying the structure to the bedrock.

Burrinjuck Dam is one of the first dams in NSW to have environmental flow releases based on inflows.

TOURIST ATTRACTIONS

About a quarter of a million tourists a year sample the delights of the dam and its surrounds. As well as the Burrinjuck State Recreation Area, the area includes caravan and camping sites and the lake can be used for boating, fishing, water skiing, and swimming. The foreshores provide opportunities for picturesque bushwalks, bird watching and picnicking.

The dam has created an enormous lake between the mountains, which supports a variety of wildlife.

Anglers are enticed by Burrinjuck’s most common species, trout, which inhabit the dam along with other species such as Murray cod, perch and Atlantic salmon. An abundance of native vegetation and bird life – parrots, wrens, magpies, kookaburras and wood ducks – inhabit the nearby parks and reserves as well as the foreshores and islands.

Please heed the warning signs as you use the foreshores. Occasionally blue-green algal blooms affect the dam, and therefore visitors must check the water quality alert levels.

Left: Flood event of 1925

